CLAIMS

1. A fluid ejection device comprising:

a first fluid feed source having a first fluid feed source edge in communication with a substrate surface;

first firing resistors disposed along the first fluid feed source and configured to respond to a first current to heat fluid provided by the first fluid feed source; and

a reference conductor configured to conduct the first current from the first firing resistors, wherein the reference conductor is disposed between the first fluid feed source edge and the first firing resistors.

2. The fluid ejection device of claim 1, wherein the reference conductor is disposed between at least two of the first firing resistors.

3. The fluid ejection device of claim 1, comprising drive switches, wherein each of the drive switches is electrically coupled to a corresponding first firing resistor of the first firing resistors and the reference conductor is disposed over a portion of the drive switches.

4. The fluid ejection device of claim 1, comprising firing resistor areas disposed along the first fluid feed source, wherein the reference conductor is disposed between at least two adjacent firing resistor areas.

5. The fluid ejection device of claim 1, comprising drive switches formed in a first layer and firing resistor areas formed in a second layer disposed along the first fluid feed source, wherein the reference conductor is disposed between adjacent firing resistor areas and over a portion of the drive switches.

6. The fluid ejection device of claim 1, comprising drive switches, wherein each of the drive switches is electrically connected to a corresponding first firing resistor of the first firing resistors and the reference conductor.

7. The fluid ejection device of claim 1, comprising drive switches, wherein each of the drive switches is a field effect transistor that is electrically connected between a corresponding first firing resistor and the reference conductor.

8. The fluid ejection device of claim 1, wherein the reference conductor is disposed along the entire length of the first fluid feed source.

9. The fluid ejection device of claim 1, wherein the reference conductor is disposed along opposing sides of the first feed slot and along the entire length of the opposing sides of the first fluid feed source.

10. The fluid ejection device of claim 1, wherein the first firing resistors are disposed along opposing sides of the first fluid feed source and the reference conductor is disposed between the first firing resistors and the first fluid feed source edge along one of the opposing sides of the first fluid feed source and the first firing resistors and a second fluid feed source edge along another one of the opposing sides of the first fluid feed source.

11. The fluid ejection device of claim 1, comprising second firing resistors disposed along the first fluid feed source and configured to respond to a second current to heat fluid provided by the first fluid feed source, wherein the reference conductor is configured to conduct the second current from the second firing resistors and the reference conductor is disposed between the first fluid feed source edge and the second firing resistors.

12. The fluid ejection device of claim 11, wherein the second firing resistors are disposed on opposing sides of the first fluid feed source and the reference conductor is disposed between the second firing resistors and the first fluid feed

source edge along one of the opposing sides of the first fluid feed source and the second firing resistors and a second fluid feed source edge along another one of the opposing sides of the first fluid feed source.

13. The fluid ejection device of claim 11, comprising a second fluid feed source and third firing resistors disposed along the second fluid feed source and configured to respond to a third current to heat fluid provided by the second fluid feed source, wherein the reference conductor is configured to conduct the third current from the third firing resistors, and the reference conductor is disposed between the third firing resistors and a second fluid feed source edge along the second fluid feed source.

14. The fluid ejection device of claim 13, wherein the third firing resistors are disposed on opposing sides of the second fluid feed source and the reference conductor is disposed between the third firing resistors and the second fluid feed source edge along one of the opposing sides of the second fluid feed source and the third firing resistors and a third fluid feed source edge along another one of the opposing sides of the second fluid feed source.

15. The fluid ejection device of claim 13, comprising fourth firing resistors disposed along the second fluid feed source and configured to respond to a fourth current to heat fluid provided by the second fluid feed source, wherein the reference conductor is configured to conduct the fourth current from the fourth firing resistors and the reference conductor is disposed between the second fluid feed source edge and the fourth firing resistors.

16. The fluid ejection device of claim 15, wherein the fourth firing resistors are disposed on opposing sides of the second fluid feed source and the reference conductor is disposed between the fourth firing resistors and the second fluid feed source edge along one of the opposing sides of the second fluid feed source and the fourth firing resistors and a third fluid feed source edge along another one of the opposing sides of the second fluid feed source.

17. The fluid ejection device of claim 15, comprising fifth firing resistors, wherein a first portion of the fifth firing resistors are disposed along the first fluid feed source and configured to respond to a fifth current to heat fluid provided by the first fluid feed source and a second portion of the fifth firing resistors are disposed along the second fluid feed source and configured to respond to the fifth current to heat fluid provided by the second fluid feed source, wherein the reference conductor is configured to conduct the fifth current from the fifth firing resistors and is disposed between the first fluid feed source edge and the first portion of the fifth firing resistors and between the second fluid feed source edge and the second portion of the fifth firing resistors.

18. The fluid ejection device of claim 17, comprising sixth firing resistors, wherein a first portion of the sixth firing resistors are disposed along the first fluid feed source and configured to respond to a sixth current to heat fluid provided by the first fluid feed source and a second portion of the sixth firing resistors are disposed along the second fluid feed source and configured to respond to the sixth current to heat fluid provided by the second fluid feed source, wherein the reference conductor is configured to conduct the sixth current from the sixth firing resistors and is disposed between the first fluid feed source edge and the first portion of the sixth firing resistors and between the second fluid feed source edge and the second portion of the sixth firing resistors.

19. The fluid ejection device of claim 1, comprising a second fluid feed source having a second fluid feed source edge in communication with the substrate surface and second firing resistors, wherein a first portion of the second firing resistors are disposed along the first fluid feed source and configured to respond to a second current to heat fluid provided by the first fluid feed source and a second portion of the second firing resistors are disposed along the second fluid feed source and configured to respond to the second current to heat fluid provided by the second fluid feed source, wherein the

reference conductor is configured to conduct the second current from the second firing resistors and is disposed between the first fluid feed source edge and the first portion of the second firing resistors and between the second fluid feed source edge and the second portion of the second firing resistors.

20. The fluid ejection device of claim 1, wherein the reference conductor comprises a conductive layer and a resistive layer.

21. The fluid ejection device of claim 1, comprising:

vaporization chambers fluidically coupled to the first fluid feed source; and

an isolation layer configured to isolate the reference conductor from fluid flowing from the fluid feed source to the vaporization chambers, wherein the reference conductor is disposed between the vaporization chambers and the first fluid feed source edge.

22. A fluid ejection device comprising:

a first fluid feed source having a first fluid feed source edge;

first vaporization chambers fluidically coupled to the first fluid feed source;

a reference conductor disposed between the first vaporization chambers and the first fluid feed source edge; and

an isolation structure configured to isolate the reference conductor from fluid flowing over the first fluid feed source edge to the first vaporization chambers.

23. The fluid ejection device of claim 22, wherein the reference conductor is disposed between at least two of the first vaporization chambers.

24. The fluid ejection device of claim 22, wherein the reference conductor is disposed along opposing sides of the first fluid feed source.

25. The fluid ejection device of claim 22, wherein the first vaporization chambers are disposed along opposing sides of the first fluid feed source and the reference conductor is disposed between the first vaporization chambers and the first fluid feed source edge along one of the opposing sides of the first fluid feed source and the first vaporization chambers and a second fluid feed source edge along another one of the opposing sides of the first fluid feed source.

26. The fluid ejection device of claim 22, comprising fluid paths, wherein each of the fluid paths is fluidically coupled to the first fluid feed source and a corresponding one of the first vaporization chambers and the reference conductor is isolated from fluid flowing through the fluid paths by the isolation structure.

27. The fluid ejection device of claim 22, comprising:

a second fluid feed source having a second fluid feed source edge; and

second vaporization chambers fluidically coupled to the second fluid feed source, wherein the reference conductor is disposed between the second vaporization chambers and the second fluid feed source edge and the isolation structure is configured to isolate the reference conductor from fluid flowing over the second fluid feed source edge to the second vaporization chambers.

28. The fluid ejection device of claim 27, wherein the reference conductor is disposed between at least two of the second vaporization chambers.

29. The fluid ejection device of claim 27, wherein the second vaporization chambers are disposed along opposing sides of the second fluid feed source and the reference conductor is disposed between the second vaporization chambers and the second fluid feed source edge along one of the opposing sides of the second fluid feed source and the second vaporization chambers and a third fluid feed source edge along another one of the opposing sides of the second fluid feed source.

30. The fluid ejection device of claim 22, comprising firing resistors, wherein each of the firing resistors is disposed in a corresponding one of the first vaporization chambers and configured to respond to a current to heat fluid provided by the first fluid feed source and the reference conductor is configured to conduct the current from the firing resistors.

31. The fluid ejection device of claim 30, comprising drive switches, wherein each of the drive switches is electrically coupled between a corresponding one of the firing resistors and the reference conductor.

32. The fluid ejection device of claim 31, wherein the reference conductor is disposed over a portion of the drive switches.

33. The fluid ejection device of claim 31, wherein the reference conductor is disposed between two of the firing resistors.

34. The fluid ejection device of claim 31, wherein the reference conductor is disposed between two of the firing resistors and over a portion of the drive switches.

35. A fluid ejection device comprising:

a first fluid feed source having a first fluid feed source edge;

first firing resistors disposed along the first fluid feed source and configured to respond to a first current to heat fluid provided by the first fluid feed source;

first drive switches disposed along the first fluid feed source, wherein each of the first drive switches is electrically coupled to one of the first firing resistors; and

a reference conductor disposed over a portion of the first drive switches and extending to between the first firing resistors and the first fluid feed source edge.

36. The fluid ejection device of claim 35, comprising vaporization chambers fluidically coupled to the first fluid feed source, wherein each of the first firing resistors is disposed substantially adjacent to a corresponding one of the vaporization chambers and the reference conductor is disposed between the vaporization chambers and the first fluid feed source edge.

37. The fluid ejection device of claim 35, wherein the reference conductor is disposed between at least two of the first firing resistors.

37. The fluid ejection device of claim 35, wherein the reference conductor is disposed between at least two of the first firing resistors and between two of the first drive switches.

38. The fluid ejection device of claim 35, wherein the first firing resistors are disposed on opposing sides of the first fluid feed source and the first drive switches are disposed on the opposing sides of the first fluid feed source, and the reference conductor is disposed over a portion of the first drive switches and between the first firing resistors and the first fluid feed source edge along one of the opposing sides of the first fluid feed source and over a portion of the first drive switches and between a second fluid feed source edge along another one of the opposing sides of the first fluid feed source.

39. The fluid ejection device of claim 35, comprising:

a second fluid feed source having a second fluid feed source edge;

second firing resistors disposed along the second fluid feed source and configured to respond to the first current to heat fluid provided by the second fluid feed source; and

second drive switches disposed along the second fluid feed source, wherein each of the second drive switches is electrically coupled to one of the second firing resistors and the reference conductor is disposed over a portion of

the second drive switches and extending to between the second firing resistors and the second fluid feed source edge.

40. The fluid ejection device of claim 35, comprising:

second firing resistors disposed along the first fluid feed source and configured to respond to a second current to heat fluid provided by the first fluid feed source; and

second drive switches disposed along the first fluid feed source, wherein each of the second drive switches is electrically coupled to one of the second firing resistors and the reference conductor is disposed over a portion of the second drive switches and extending to between the second firing resistors and the first fluid feed source edge.

41. The fluid ejection device of claim 35, comprising:

a second fluid feed source having a second fluid feed source edge;

second firing resistors disposed along the second fluid feed source and configured to respond to a second current to heat fluid provided by the second fluid feed source; and

second drive switches disposed along the second fluid feed source, wherein each of the second drive switches is electrically coupled to one of the second firing resistors and the reference conductor is disposed over a portion of the second drive switches and extending to between the second firing resistors and the second fluid feed source edge.

42. A method of operating a fluid ejection device, comprising:

receiving fluid from a first fluid feed source having a first fluid feed source edge in communication with a substrate surface;

receiving a first current at first firing resistors disposed along the first fluid feed source;

heating the fluid received from the first fluid feed source in response to the received first current at the first firing resistors;

receiving the first current from the first firing resistors on a reference conductor; and

conducting a first part of the first current on the reference conductor disposed between the first fluid feed source edge and the first firing resistors.

43. The method of claim 42, comprising:

first firing resistor areas; and

conducting a second part of the first current on the reference conductor disposed between the first firing resistor areas.

44. The method of claim 42, comprising:

gating the first current through drive switches; and

conducting a second part of the first current on the reference conductor over a portion of the drive switches.

45. The method of claim 44, comprising conducting a second part of the first current on the reference conductor along the entire length of the first fluid feed source.

46. The method of claim 44, comprising receiving the first current from the first firing resistors on opposing sides of the first fluid feed source.

47. The method of claim 44, comprising:

receiving a second current at second firing resistors disposed along the first fluid feed source;

heating the fluid received from the first fluid feed source in response to the received second current at the second firing resistors;

receiving the second current from the second firing resistors on the reference conductor; and

conducting part of the second current on the reference conductor disposed between the first fluid feed source edge and the second firing resistors.

48. The method of claim 47, comprising:

receiving fluid from a second fluid feed source having a second fluid feed source edge in communication with the substrate surface;

receiving the first current at second firing resistors disposed along the second fluid feed source;

heating the fluid received from the second fluid feed source in response to the received first current at the second firing resistors; and

conducting a second part of the first current on the reference conductor disposed between the second fluid feed source edge and the second firing resistors.

49. The method of claim 44, comprising:

receiving fluid from a second fluid feed source having a second fluid feed source edge in communication with the substrate surface;

receiving a second current at second firing resistors disposed along the second fluid feed source;

heating the fluid received from the second fluid feed source in response to the received second current at the second firing resistors;

receiving the second current from the second firing resistors on the reference conductor; and

conducting part of the second current on the reference conductor between the second fluid feed source edge and the second firing resistors.

50. A method of operating a fluid ejection device, comprising:

supplying fluid from a fluid feed source over a fluid feed source edge and a reference conductor to vaporization chambers; and

receiving the fluid in the vaporization chambers.

51. A fluid ejection device comprising:

a fluid feed source;

firing resistors disposed along the fluid feed source and configured to respond to a current to heat fluid provided by the fluid feed source; and

a reference conductor configured to conduct the current from the firing resistors, wherein the reference conductor is disposed between two of the firing resistors.

52. The fluid ejection device of claim 51, comprising firing resistor areas disposed along the fluid feed source, wherein the reference conductor is disposed between adjacent firing resistor areas.

53. A fluid ejection device comprising:

a first fluid feed source;

first firing resistors disposed along the first fluid feed source and configured to respond to a first current to heat fluid provided by the first fluid feed source;

first drive switches disposed along the first fluid feed source on a first side of the first firing resistors, wherein each of the first drive switches is electrically coupled to one of the first firing resistors; and

a reference conductor disposed along the first feed source on a second side of the first firing resistors.

54. The fluid ejection device of claim 53, wherein the reference conductor is disposed on the first side of the resistors.

55. A fluid ejection device comprising:

a first fluid feed source;

first vaporization chambers fluidically coupled to the first fluid feed source; and

a reference conductor disposed under a fluid path between the first fluid feed source and the first vaporization chambers.

56. The fluid ejection device of claim 55 comprising:

an isolation structure configured to isolate the reference conductor from fluid flowing through the fluid path.

57. A fluid ejection device comprising:

a first fluid feed source;

a second fluid feed source;

a first fire line adapted to receive a first energy signal comprising energy pulses;

first drop generators fluidically coupled to the first fluid feed source; and

second drop generators fluidically coupled to the second fluid feed source, wherein each of the first drop generators and each of the second drop generators are electrically coupled to the first fire line and configured to respond to the first energy signal to eject fluid.

58. A fluid ejection device comprising:

a first fluid feed source;

a second fluid feed source;

a first fire line adapted to receive a first energy signal comprising energy pulses;

a second fire line adapted to receive a second energy signal comprising energy pulses;

first drop generators fluidically coupled to the first fluid feed source;

second drop generators fluidically coupled to the second fluid feed source; and

third drop generators fluidically coupled to the first fluid feed source, wherein each of the first drop generators and each of the second drop generators are configured to respond to the first energy signal to eject fluid and each of the third drop generators are configured to respond to the second energy signal to eject fluid.

59. A fluid ejection device comprising:

a first fluid feed source;

first drop generators fluidically coupled to the first fluid feed source; and

a first fire line adapted to receive a first energy signal comprising energy pulses, wherein the first drop generators are configured to respond to the first energy signal to eject fluid and the first fire line comprises a layered portion comprising a first conductive layer and a second conductive layer electrically coupled to the first conductive layer.

60. A fluid ejection device comprising:

a first fluid feed source;

a second fluid feed source;

first drop generators fluidically coupled to the first fluid feed source and disposed between the first fluid feed source and the second fluid feed source;

second drop generators fluidically coupled to the first fluid feed source and disposed between the first fluid feed source and the second fluid feed source;

a first fire line adapted to receive a first energy signal comprising energy pulses; and

a second fire line adapted to receive a second energy signal comprising energy pulses, wherein each of the first drop generators are electrically coupled to the first fire line and each of the second drop generators are electrically coupled to the second fire line, and the first fire line is disposed adjacent the second fire line and bypasses the second drop generators between the first fluid feed source and the second fluid feed source.

61. A fluid ejection device comprising:

means for receiving fluid from a first fluid feed source;

means for receiving fluid from a second fluid feed source;

means for receiving a first energy signal comprising energy pulses;

means for responding to the first energy signal to eject fluid received from the first fluid feed source;

means for responding to the first energy signal to eject fluid received from the second fluid feed source, wherein the means for receiving the first energy

signal is electrically coupled to the means for responding to the first energy signal to eject fluid received from the first fluid feed source and the means for responding to the first energy signal to eject fluid received from the second fluid feed source.

62. A method of operating a fluid ejection device comprising:

receiving fluid from a first fluid feed source in first drop generators;

receiving fluid from a second fluid feed source in second drop generators;

receiving a first energy signal comprising energy pulses in a first fire line; and

responding to the first energy signal to eject fluid from the first drop generators and the second drop generators.